Module for integration in a home network

The invention relates to a module for integration in a
home network with individual devices which are
5   connected to one another and communicate among one
another via one or more protocols, the home network
having at least one connecting device which allows
communication with an external network.

10   A home network is understood to be the amalgamation of
a plurality of functionally quite different devices
e.g. in a residence or a small office. The devices are
e.g. communications devices, such as telephone and fax,
entertainment devices, such as television, DVD player,
15   etc., and work devices, such as computer and the like.
In some instances, domestic appliances and household
equipment, such as refrigerator and heating, are also
connected to such a network. The devices are set up to
communicate with one another by means of defined
20   protocols (e.g. HAVi, Home Audio/Video
Interoperability, or UPnP, Universal Plug and Play) and
to exchange digital or alternatively analog data among
one another. This opens up the possibility of data
which are present in a specific device of the home
25   network also being made available to the other devices
that are integrated in the home network. Thus, it is
conceivable, by way of example, for music which is
present in the form of a file in a computer in the
study to be reproduced via a stereo system in the
30   living room. At the same time, it is possible, under
certain circumstances, for the stereo system to be
controlled by means of a menu displayed on a television
that is integrated in the home network.

35   In addition to the possibility of the internal exchange
of data, however, some devices furthermore also have
connections to external networks: the telephone is
connected to a telephone network (analog, ISDN) and the

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television is connected to a cable network which serves
to transmit video and audio signals, but is also
increasingly used for the transmission of data for a
computer. The computer is connected by a modem to the

5   Internet with its diverse services (World Wide Web,
Usenet etc.) or to comparable networks. In this case,
each device independently produces a connection to the
associated network and is then able to localize and to
retrieve the required data there and subsequently to

10   process them. However, this presupposes that, in the
residence, in the house or in the office, the various
external networks are routed through to the respective
device, which is associated with a considerable
installation outlay.

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Therefore, it has already been proposed to centralize
the network accesses. Thus, US-A 5,886,732 shows the
possibility of combining a plurality of network
accesses (NIU: Network Interface Units) of different

20   providers in a central station which interacts with a
plurality of home networks via a switched node (switch
hub), such a network comprising e.g. a set-top
electronic unit STE without the otherwise customary
network access means. A plurality of devices (CVCR,

25   DCAM, DTV1) that process video and audio signals are
connected to the STE via a data bus. Accordingly, the
set-top electronic unit STE no longer performs the
function of realizing the network access, but still has
the task of conditioning the received data for the

30   connected devices.

The system in accordance with WO 01/56233 is also based
on this principle: a central telephone access system
which can utilize the various services offered, such as

35   analog, ISDN, DSL, serves as access to the telephone
network and to the Internet for connected computers and
other devices: here, too, the central station only has
the task of producing the network access.

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The situation is similar in accordance with
EP 1 017 206 A2: the individual devices of the home
network are connected to the Internet via a central
5   network access (home gateway) located outside the home
network. Each device thus sets up its access to the
Internet independently of the other devices of the
network. The system makes it possible to access the
various devices in the home network from the Internet
10   via a single address.

In the case of the previously known systems, although
the individual devices no longer have to establish the
network access, they continue to be responsible for
15   finding or filtering out the desired data in the
external network and converting them into formats
suitable for reproduction. This task is associated with
a considerable outlay, however, since video and audio
data, in particular, are likely to be present in
20   different formats which, under certain circumstances,
cannot be processed by the devices, and even the
formats of data which describe the respective data
contents (metadata) vary. Moreover, the transmission
protocols (e.g. IP (Internet Protocol), UDP (User
25   Datagram Protocol) or RTP (Real-Time Transport
Protocol)) used in the external network are also not
necessarily compatible with the transmission protocols
of the home network. Although UPnP, for example, is
based on the Internet Protocol IP, that still does not
30   mean, however, that a terminal communicating by means
of UPnP can process specific audio/video data by means
of IP. Therefore, a search unit must know all or at
least the predominant formats and protocols in order to
be able to receive and process the data that are stored
35   in the external network with a corresponding format.
Furthermore, a search unit must be able to establish
connection with various providers of data in order to
be able to find the stored data. The abovementioned

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tasks of a search unit require a high outlay on
software and associated hardware, which causes high
costs.

5   Consequently, the invention is based on the problem of
reducing the outlay on software and hardware required
for the search units of devices in a home network, so
that the connected devices are simpler in their
construction and hence more cost-effective.
10
In order to solve the problem, the invention provides a
module for integration in a home network having the
further features that the module has one or more search
units in particular for finding data available at
15   providers in the external network and is able to
receive the data and/or the metadata describing their
content and can make them available to the devices of
the home network. In this way, the search function is
performed by a central module so that the connected
20   devices no longer have to provide this function
themselves. As a result, said devices can be produced
more cost-effectively. The module may be realized both
in the form of a computer program which uses available
electronics in the home network, for example in the
25   computer or in the connecting device, and as an
autonomous device with electronics and programming. The
search unit must on the one hand know the addresses of
providers via which it can obtain data, and on the
other hand it must be able to communicate with said
30   providers and evaluate the received data. The search
unit therefore has to know what details in what form it
must give the various providers in order to acquire the
desired data. In this case, providers are not only to
be understood as commercial providers of data which
35   make available "video/music on demand" or live TV or
radio programs, for example, the operators of private
pages on the Internet or the known search engines on
the Internet also constitute providers. In principle, a

provider is anyone who makes data available to others
free of charge or for payment via a network.

5   The term data is to be understood both as files and as
data streams which in the actual sense do not
constitute files. By way of example, live TV programs
are received by an IP-TV server directly from a
satellite and converted in real time into an IP data
stream to which devices in the home network can be
10   connected. In this case, no audio/video files are
stored, rather only data are forwarded to the terminal.

The module can be improved further by having a format
converter, which converts the data of the external
15   network into a format which corresponds to one of the
formats which are defined for the exchange of data in
the home network and are readable for the devices in
the home network. In this way, a possibly required
format conversion of the data requested from the
20   external network is also shifted from the individual
devices of the home network to the module, so that the
individual devices of the home network are simplified
further.

25   In an advantageous manner, the format converter is
able, moreover, to convert data in a format which
corresponds to one of the formats which are defined for
the exchange of data in the home network and are
readable for the devices in the home network into a
30   format used in the external network. In this way, data
which are requested from the home network by the
external network can also be made available without any
further outlay.

35   According to the invention, the search unit and/or the
format converter can be updated. This has the
advantage, inter alia, that, in the event of newly
emerging formats or in the event of changes to the

addresses or communication methods of providers in the
external network, only the module or the format
converter and the search unit have to be set to these
new formats or the new addresses and methods, while the
5   other devices in the network can still have recourse to
a form that is readable for them. Thus, these devices
do not need to be exchanged or updated. The updating
may be effected, for example, by means of information
from the external network made available by the
10   providers. However, it is equally conceivable for a
service provider to collate this information and make
it available as a chargeable service, whether by direct
dispatch via the network or by the provision of a
storage medium holding the information.
15

In an advantageous manner, the module communicates with
the other devices of the home network by means of one
of the protocols defined for the home network. In this
way, the programming of the individual devices of the
20   home network is very simple: the devices only have to
communicate with the module in the formats defined for
the home network. For the inquiring device, the
situation is as if the connecting device had the data
inquired about in an appropriate format for the
25   inquiring device. The fact that the connecting device
first of all itself obtains the respective data from
the external network and, if appropriate, subjects them
to a format conversion remains hidden from the
inquiring device. The module could thus be manifested
30   as a standard device in the home network, for example
as a central media store.

According to the invention, the module converts control
data from a protocol defined for the home network into
35   a protocol used by the external network or by a
provider of data. This is of interest in particular for
the case where the transmitted data are data streams,
as occur for example with "video/audio on demand" or

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live TV programs. The conversion of the control data
allows the devices in the home network to control the
source of the data without knowing the corresponding
protocols. Control data may be, for example, commands
5   such as START, STOP, PAUSE, FAST FORWARD etc.

In order to be able to adapt the data transmission into
the home network, if appropriate, to the transmission
speed of the external network, or in order to provide a
10   buffer for a format conversion, the module has a
memory, which stores the received data and, if
appropriate, the data converted into the format defined
for the home network.

15   The invention is particularly beneficial if the
external network is the Internet. It is precisely in
this network that numerous data are available which,
however, first have to be found in order to be able to
be used by the respective end user device. On the
20   Internet, it has also been possible to establish
different protocols for data transmission and formats
in which data are stored or made available in files or
data streams, so that the search units must be able to
understand and interpret a plurality of protocols and
25   formats. In this case, the searching through the
external network is performed by programs referred to
as agents. The content descriptions of the providers in
the external network are gradually evaluated and
compared with the inquiry from the home network. If a
30   match is found, the corresponding data are downloaded
via the connecting device.

The data from the external network are typically text,
audio and/or video data. Since, as a general rule, home
35   networks are primarily used for exchanging multimedia
data, these types of data are those which are requested
the most often. However, the data may, of course, also
involve other types of data for the connected devices,

for example updates for the software on a computer,
program updates for a washing machine, weather data or
forecasts for a heating system, present energy costs
for storage heating, and much more.

5

According to the invention, the module communicates
with the devices of the home network via a data bus.
Via the data bus, information about the type and
setting of the respective device is exchanged, so that

10   the various devices can identify themselves and adapt
themselves to one another, that is to say communicate
their respective type and settings, and, moreover, data
are exchanged and forwarded, which data are then used
for reproduction and/or recording in the respective

15   device. In this case, the communication between the
devices can be effected both in a wire-based manner and
in a wire-free manner (e.g. Bluetooth, etc.).

In an advantageous manner, the module is integrated in

20   the connecting device. In this way, a single device
performs all the tasks necessary for communication with
the external network, that is to say both the
connection to the external network and the search for
data and the conversion of the data into suitable

25   formats. It goes without saying, however, that the
module may also be an autonomous device which can be
integrated without difficulty into an already existing
home network.

30   In accordance with a further improvement the module is
able to receive and process inquiries from the external
network and send data from the home network into the
external network. This makes it possible, by way of
example, for a user, even from outside the home

35   network, via the external network, to establish contact
with the devices in the home network and to retrieve
the data which can be made available by them, without
having to rely on a special protocol for this purpose.

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Furthermore, in this way, one's own data can also be made available to other persons. For this purpose, it is advantageous to provide a method for the monitoring and control of the access rights and for

5 identification.

It goes without saying that combinations of advantageous features likewise lie within the scope of validity of the invention.

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In order to provide a better understanding, the invention will be explained in more detail below using an exemplary embodiment. For this purpose:

15 figure 1   shows a diagrammatic illustration of a module
             according to the invention in a home network
             which communicates with an external network
             via a connecting device.

20 A home network is designated by 1. A plurality of
    devices 2, 3, 4, 5 are connected to one another in this
    local network. Said devices are typically one or a
    plurality of computers, and also reproduction devices
    for sound and picture information, such as e.g. video
25 devices, DVD or CD players. The devices communicate
    among one another in accordance with specific
    protocols, which makes it possible for one device to be
    controlled by another or for the data available in one
    device to be made available to other devices as well.
30 Moreover, the devices inform one another of their
    settings, so that an adaptation that normally has to be
    performed manually is effected automatically. Various
    protocols, such as HAVi or UPnP, geared specifically to
    such local amalgamations of devices have become
35 established for this.

The communication with an external network, e.g. the
Internet, which is marked by the reference symbol 10,

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poses certain problems, however, since dedicated
protocols, e.g. TCP/IP, are defined for this, which are
generally not understood except by computers. In the
external network 10, however, providers 11, 12 hold
5   data which could actually be reproduced and/or recorded
by the devices 2, 3, 4 of the home network 1. Said data
involves e.g. pieces of music or else cinema films or
texts. For access to the corresponding data, the home
network 1 has a connecting device 5, which produces the
10   connection to the external network 10, and also a
module 6, in which a search unit 7 is integrated. The
search unit 7 establishes contact with the providers
11, 12 and serves for finding the desired data in the
external network 10.
15

The module 6 controls the data exchange protocols of
the external network 10 and is able to understand and
evaluate the formats used by the various providers 11,
12 for describing the content of data. For this
20   purpose, said module contains, under certain
circumstances, a plurality of submodules (not
illustrated) which are set to the most important
formats for describing data contents. For all the other
devices 2, 3, 4 of the home network 1, insofar as they
25   wish to access such data, the module 6 performs the
task of finding corresponding data in the external
network 10.

Insofar as the devices 2, 3, 4 can process the data
30   directly, they are transferred directly. However, the
module 6 also contains a format converter 8 which
possibly performs a format conversion. The module 6
communicates with the devices 2, 3, 4 of the home
network 1 in accordance with one of the protocols
35   defined for the home network. It accepts e.g. the
inquiries of the other devices 2, 3, 4 for specific
contents and issues a corresponding search job to the
search unit 7. Consequently, to the inquiring devices

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2, 3, 4, the module 6 appears as a carrier of the
desired data, as if it were a central media server, for
example, on which the desired data are stored. In order
to adapt the module 6 to the transmission speed of the
5   external network 10 a memory 9 is provided for the
module 6, the data from the external network 10 being
stored in said memory.